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by Casey R. Warman

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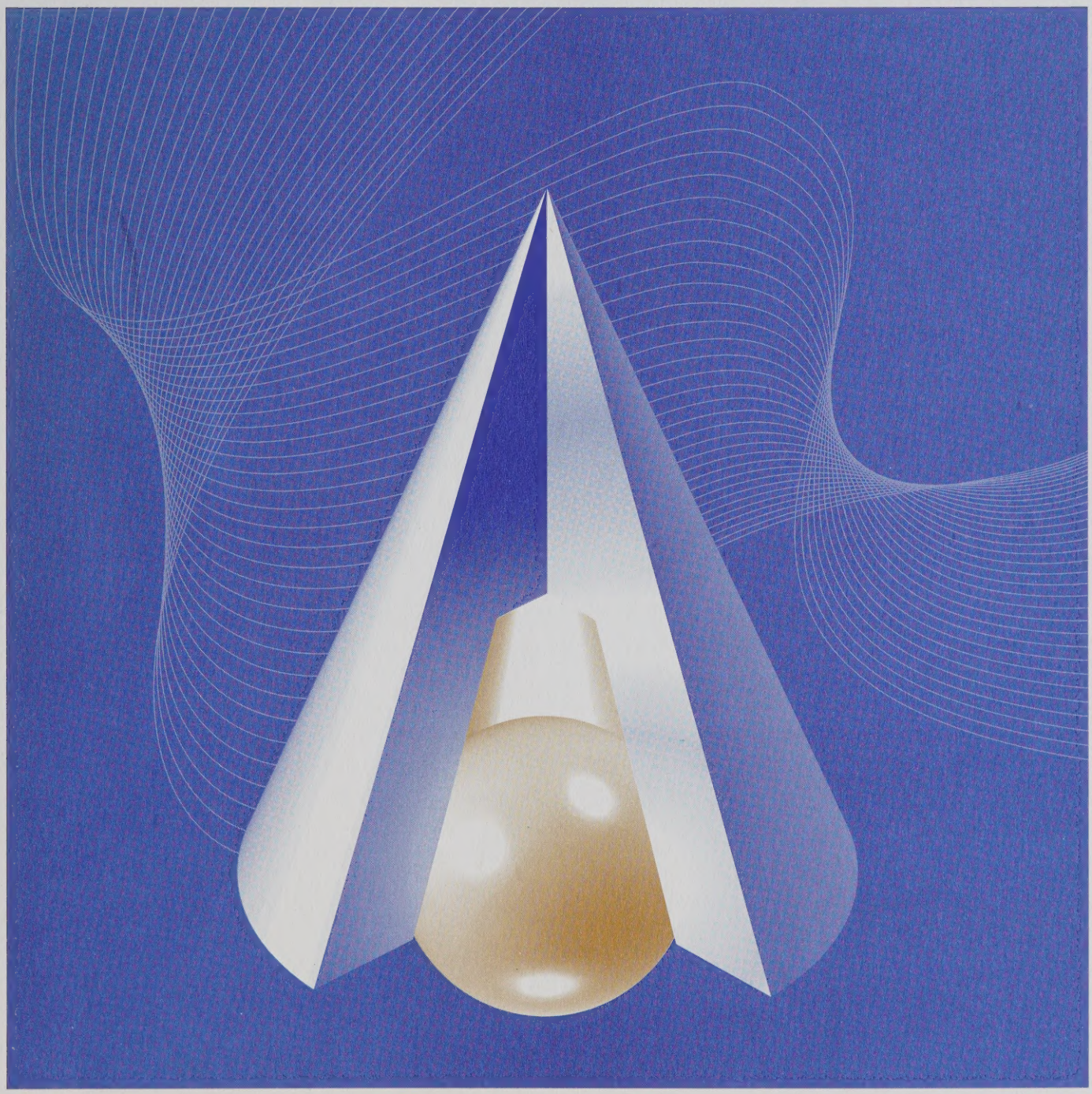

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Abstract

This paper examines the effect of ethnic neighbourhoods on wage growth as well as other labour market outcomes of immigrant men in Canada using the 1981, 1986, 1991 and 1996 Censuses. While the primary measure of affiliation is country of birth, ethnicity, language and visible minority status are also examined to determine the robustness of the findings. Consistent with U.S. findings, ethnic neighbourhoods based on country of birth are found to have a negative impact on the ten-year wage growth of immigrants. Further, the model for wage growth is found to be robust to different lengths of time and different base years as well as the specification of language and ethnicity as the affiliation grouping. Using country of birth as the affiliation index, exposure is also found to have a negative impact on the growth of total and weekly earnings as well as the initial wages of entry cohorts. While little evidence is found on the effects of ethnic neighbourhoods on changes in employment, a negative effect of exposure is found on entry employment rates of the most recent landing cohorts. Although the overall effect of ethnic neighbourhoods on wage growth is negative, ethnic neighbourhoods are found to have a divergent effect on different landing cohorts, having a positive impact on the wage growth of the more recent cohorts and a negative impact on earlier cohorts.

JEL Codes: J15, J31, J61

Keywords: Immigrants, earnings, ethnic neighbourhoods

1. Introduction

Immigration continues to be an important element of modern Canadian society. Besides composing an increasing proportion of the general population, immigrants make up an increasing proportion of the labour market. It is estimated that by the end of the decade, all new labour force growth will come from immigration.[1] With the growing importance of immigrants on the overall health of the Canadian economy, the labour market outcomes of immigrants is an important issue. This paper examines the effect of ethnic neighbourhoods on the labour market outcomes of immigrants.

While immigrants have become a more significant part of the Canadian labour force, their labour market performance has deteriorated in recent decades. The deterioration in the labour market outcomes of recent immigrant cohorts to Canada is well documented. Studies by Baker and Benjamin (1994) and Bloom, Grenier and Gunderson (1995) both found that more recent immigrant cohorts have not assimilated as well as previous cohorts.[2] This phenomenon is not exclusive to Canada. In the United States, Borjas (1995) found that the entry wage of the 1970 and 1980 cohorts was lower than that of earlier cohorts and that a wage disadvantage between the recent cohorts and the native population would always exist. While most research has detected a poorer economic performance of recent immigrant cohorts, the reason for this decline has not been fully explained. Potential explanations could include: a change in the composition of immigrant classes,[3] a change in composition of sending countries from western European to Asian and African countries (De Silva, 1997a), discrimination (Pendakur and Pendakur, 1998), macro conditions (McDonald and Worswick, 1997; McDonald and Worswick, 1998),[4] and a change in the human capital of immigrants (Coulson and Devoretz, 1993).

Another potential explanation is the effect of residential patterns on immigrants. Immigrants have not settled randomly across the country. They tend to settle in the large Canadian urban centres, and different groups tend to settle more densely in different urban centres. In addition, these immigrant groups tend to cluster in neighbourhoods within these urban centres. If clustering inhibits the acquisition of skills necessary for labour market success, the tendency for immigrants to cluster based on ethnicity, language and birthplace may help to explain the poor fairing of recent cohorts. In 1967, with changes to Canadian Immigration policy, a point and class system was introduced and consequently immigration was no longer determined by country of birth.[5] With this change in immigration policy, there was a drastic shift in country of origin of immigrants. Prior to this shift in policy, immigrants from countries that were seen as being similar to Canada were given preferential treatment. Other countries were viewed as "having values that were too far removed from Canadian values to enable them to adapt to Canadian society"

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1. With immigrants already making up 70% of the labour force growth in 2001, estimates by Statistics Canada (2003) show that by 2011, all new growth could be created by immigrants.
2. Conversely, Grant (1999) finds an improvement in the earnings assimilation for immigrants during the 1980s.
3. Green (1999) notes that there has been a change in the composition of the classes admitted into Canada, for example, the proportion of immigrants coming from the independent class dropped from 70% in 1973 to 20% in 1992. However, De Silva (1997b) finds that earnings of different immigrant classes converges over time.
4. McDonald and Worswick (1997) find that differences in unemployment probabilities of immigrants are affected by macro conditions, but over time, these rates come to resemble the rates experienced by non-immigrant men. McDonald and Worswick (1998) found that macro conditions affect the rate of earnings assimilation.
5. For a thorough examination of the history of Canadian immigration policy see Green and Green (1995) and Green and Green (1999).

(Weinfeld and Wilkinson, 1999). In the past, when sending countries were ethnically and culturally similar to Canada, concentration of ethnic and linguistic groups would not affect interaction between immigrants and the general Canadian population. As the composition of the sending countries has changed, and the language and culture of the new cohorts has become remarkably different from previous cohorts, ethnic concentration may isolate immigrants from the general Canadian labour market. Consequently, ethnic concentration may hinder the transmission of human capital from Canadian-born individuals to immigrants, affecting the acquisition of the type of skills necessary for success of immigrants in the Canadian labour market.

It has been argued that ethnic communities provide a hospitable atmosphere to newly arrived immigrants. With the reduction of cultural and linguistic trauma as well as the presence of job opportunities, an ethnic community may provide a newly arrived immigrant with a better environment to obtain initial success in his/her new country. An immigrant residing outside his/her ethnic community may experience increased difficulties during the initial adjustment period due to the inadequate knowledge of the local job market, knowledge that may be provided within an ethnic community. However, the level of success of an immigrant choosing to reside in his/her ethnic community may be confined to the level of opportunities present in the community. Although it is easier for an immigrant to adapt to the common language and culture present in his/her ethnic community, adaptation to the ethnic community will not encourage the accumulation of the skills required for success in the labour market (Lazear, 1999). While it is not being argued that ethnic communities will have a lower level of human capital, rather it is suggested that the skills present within the ethnic community will be less transferable to the Canadian labour market. With a relatively lower portion of human capital in an ethnic community transferable to the Canadian labour market, immigrants that locate inside their ethnic community may experience lower income growth than those immigrants who reside outside their ethnic community. Furthermore, living in their ethnic community, immigrants do not have as great an incentive or need to learn the dominant language. Residing outside his/her ethnic community, an immigrant can no longer communicate in his/her native language and therefore, must acquire a stronger understanding of the dominant language.

This paper uses the Canadian Census to examine the effect of ethnic concentration on the wage growth of male immigrants. Evidence from the United States indicates that segregation of immigrant groups has a negative impact on their labour market outcomes. Using the American Census, Borjas (2000) examined the effect of location selection on the wage growth of immigrants. He found that residing in an ethnic community had a statistically significant negative effect on the wage growth of these immigrants.

This paper applies Borjas' (2000) model to Canada. A ten-year growth model of mean wages between 1980 and 1990 (where 1980 is the base year), with country of birth as the concentration index, will be examined to be able to compare the Canadian results to Borjas' study. Variations from this specification will also be examined to determine the robustness of the results. Models with country of birth will also be run with five- and fifteen-year growth models, as well as with 1985 and 1990 as base years. The application of different base years and duration of the models will aid in determining if the results are robust to different macro conditions. Using only one base year and one time length may not give an accurate representation of the effects of residential segregation if macro conditions have a disparate influence on the impact of neighbourhoods on labour market outcomes. The shift in country of origin of immigrants is another reason for the inclusion of different base years.

While Borjas' model was run with workers with positive wages, full-time workers will also be examined when 1980 is the base year with country of birth as the concentration index.[6] With 1980 as the base year, the five-, ten- and fifteen-year growth models will also be estimated using ethnicity, mother tongue and visible minority status as the concentration index. As well, the effect of ethnic communities on other labour market activities such as the growth in earnings and change in employment will be examined.

The issue of mobility of workers is investigated. Borjas (2000) also examined this issue, but due to the ten-year duration between American Censuses and the availability of information only on five years of movement, this issue could not be fully addressed. The Canadian Census also has information about the location of individuals five years prior to the Census but has an advantage over the American Census in that the Canadian Census is produced every five years. Therefore, the bias created by the internal migration of workers can be fully controlled for utilizing five-year growth models. From the results obtained from this paper, it is hoped to determine whether ethnic communities act as a refuge where immigrants can prosper in their new country, or whether ethnic communities impede immigrants' progress confining them to the economic opportunities present within the ethnic community.

2. Ethnic and immigrant neighbourhood literature

With the increasing ethnic and cultural diversity in large Canadian and American cities, residential patterns have become an area of interest in determining the outcomes of immigrants and origin groups. As well as being examined in terms of wage rate assimilation, residential segregation has also been utilized to explain other outcomes of immigrants. Using the 1990 U.S. Census and employing home language as a proxy for social networks, Bertrand, Luttmer and Mullainathan (2000) uncover evidence that these social networks influence welfare participation. Also using the 1990 U.S Census, Chiswick and Miller (2002) examine the effect of linguistic concentration on labour income and language proficiency. They concluded that concentration of the home language had a negative effect on earnings. Further, they found that concentration of minority languages resulted in a lower proficiency in English. Using the 1991 Canadian Census, Chiswick and Miller (2001) also detected a negative effect of concentration of people of the same mother tongue on language proficiency in Canada.

The effect of ethnic communities is not confined to outcomes of immigrants. In addition to finding that segregation had a negative impact on employment and earnings of black Americans, Cutler and Glaeser (1997) find that enclaves lowered high-school graduation rates and increased the incidence of single motherhood for this group. Conversely, they found that segregation had a small positive effect on the outcomes of white Americans.

Not all studies found neighbourhood effects on the labour market outcomes of its inhabitants. Oreopoulos (2000) found that after controlling for socioeconomic characteristics, neighbourhoods had an insignificant effect on earnings, years of welfare participation, income and educational attainment of children from Toronto's subsidized housing area.

While maximization of utility derived from location selection is based on more than labour market success, the rationale of location selection will be examined in terms of labour market integration. Many non-market considerations influence the location decision of immigrants. Social factors may influence where an immigrant chooses to reside. Immigrants may choose to

6. Full-time workers are classified as having worked 40 or more weeks a year.

reside in an ethnic neighbourhood due to the utility obtained from sharing common language, culture and religion. In addition, ethnic neighbourhoods may provide a cushion from the shock of settling in a new country. Besides the effect of location on labour market income, there are other non-labour market economic considerations of residing in an ethnic concentrated area. While immigrants experience labour market benefits such as information about job opportunities and avoidance of discrimination, there are also benefits such as lower priced market and non-market ethnic goods. Due to economies of scale, the cost of ethnic goods will be lower in ethnic communities.[7] For example, churches and other cultural centres would be less expensive per capita to build in a more populous ethnic community. Also importing and producing ethnic goods will be less expensive in areas where an ethnic group is larger, since a larger volume of goods can be purchased or produced. In addition to ethnic goods being more expensive outside of an ethnic neighbourhood, these goods may not even be available. If only a few people from an ethnic group live within an area, it may be too costly to import or produce ethnic market goods and non-market goods.

This paper concentrates solely on the market success of immigrants, which is an important aspect of their utility maximizing decision. If ethnic communities are found to hinder labour market performance of immigrants, ethnic goods and non-market aspects of a neighbourhood may aid in compensating for the lower level of wage growth and equate the utility of living in an ethnic neighbourhood with the utility attained from living outside.

3. Specification of ethnic communities

Borjas (2000) classified Census Metropolitan Areas (CMAs) as the geographical unit for his analysis. While the CMA may be viewed as too large an area to consider as a neighbourhood, smaller geographical units may cause more severe problems. A smaller geographical specification, such as Census Tract, may give a more accurate portrayal of a neighbourhood, however, controlling for the interaction between a given group between two neighbourhoods would be difficult. Consider an individual from a given ethnic group *X*. If this individual lives in neighbourhood *A*, which has a low concentration of people from the same ethnic group *X*, but is in close spatial proximity to a neighbourhood *B* which has a high concentration of individuals from this same group, nothing is preventing this individual from associating with people of group *X* in neighbourhood *B*. Further, with the low cost of transportation available within CMAs, it is difficult to infer that people from the same ethnic group *X* living in neighbourhoods close by are more likely to interact than if they resided in neighbourhoods that were a further distance apart (up to a certain distance). It is difficult to presume that interaction between individuals who live within a five minute walking distance from each other is more likely than interaction between individuals whose contact is separated by a five minute drive.

This problem of controlling for cross-neighbourhood interaction does not exist when CMAs are used as the geographical unit. The distances between CMAs are great, making interaction between the same group *X* in different CMAs unlikely. Travel time and travel costs will be much larger between CMAs than within, making frequent contact unlikely.[8] It is the frequency of the interaction between people of the same origin group that is important, not the spatial proximity in

7. For a more detailed examination of ethnic goods, see Chiswick and Miller (2002).

8. Physical interaction may not be the only way in which human capital is transmitted. Telecommunication may be another method in which human capital is transmitted, changing the concept of ethnic communities. With the decreasing costs of long distance phone calls and the advent of the Internet, communication between CMAs has become less costly. While non-physical interaction is important it is beyond the limits of this paper.

which the interaction occurs. Smaller geographical units, such as Census Tracts, may be more relevant for the study of groups that are less mobile and are confined to interact within a smaller area. For example, children are limited by transportation so their interaction is limited to the immediate area and school. While the study of neighbourhood effects for children may be appropriate at the Census Tract level, the study of more mobile individuals is more suitable at the CMA level.

4. Indexes

Borjas (2000) used two indexes to measure the clustering of immigrants.[9] The primary index is the exposure index. This index gives the fraction of the population between the ages of 18 and 64 in each metropolitan area by country of birth. Both males and females in this age group, regardless of labour market status were included in the calculation of the indexes due to the human capital externalities they potentially provide.[10] The second index is the relative cluster index, which deflates the exposure index by dividing it by the percentage of the total population studied that each country of birth group makes up. This adjusts the exposure index by the proportion of the group *i* in the population studied. If the relative clustering index is greater than 1, then a higher percentage of immigrants from country *i* live in metropolitan area *j* relative to the average of the metropolitan areas studied. If the relative clustering index is equal to 1, then the percentage of people from country *i* in metropolitan area *j* is equal to the average of the population studied. Finally, if the clustering index is less than one, then there is a lower proportion of people from origin group *i* in metropolitan area *j* than would be predicted if the group was randomly assigned to the studied CMAs based on a CMA's population.

A sample of the exposure and relative indexes by country of birth are presented in Table A. In Montréal, United Kingdom immigrants make up 1.2% of the population compared to over 10% of the population in Victoria. To obtain the relative index for the U.K. immigrants, the exposure index is divided by the percent of the total population studied that U.K. immigrants compose (around 4.9% of the working age population). The relative index shows that while U.K. immigrants are underrepresented in Montréal, they are overrepresented in Victoria composing more than twice the proportion of the working age population in this city compared to the proportion they compose nationally. Looking at Finnish immigrants, they make up around 0.12% of the urban working age population, while in Thunder Bay where they compose 2.4% of the population and where they have a relative index just under 20.

The square of the exposure and relative indexes are also examined. Concentration of immigrants may have a non-linear effect on the economic assimilation of immigrants. If concentration of immigrants is found to have a negative impact on wage growth, then lower levels of concentration can be expected to have less of a negative effect on wages than a mid level of concentration. At very low levels of concentration, segregation may not take place if the community is too small. Furthermore, lower levels of concentration may provide enough information about the local job market without inhibiting the accumulation of knowledge and skills of the Canadian labour market. Higher concentration may have a negative effect on earnings. This will occur if there is still a benefit of learning the dominant language and culture but the acquisition of these skills is reduced due to the fact that a higher proportion of interaction occurs between people of the same ethnic group. Conversely, very high levels of concentration may have less of a negative effect or even a positive effect on the labour market integration of

9. See Borjas (2000) for a more in-depth explanation of the indexes.
10. Institutional residents are omitted from the analysis.

immigrants. If an ethnic group comprises a very large portion of a city, then learning the language or culture of the adopted country may not be as beneficial or necessary.

Table A: Exposure and relative clustering indexes for selected country of birth groups and CMAs in 1981

Exposure index (×100) = Nij/Nj (×100)								
CMA	**National origin group**							
	U.K.	Italy	Germany	Portugal	India	Greece	Finland	Jamaica
Montréal	1.224	3.931	0.525	0.816	0.346	1.328	0.017	0.253
Ottawa	3.963	1.552	0.912	0.680	0.608	0.257	0.034	0.322
Toronto	8.133	7.388	1.694	2.679	1.561	1.789	0.170	2.083
Kitchener	5.965	0.690	2.851	3.576	0.689	0.412	0.043	0.358
Thunder Bay	2.534	4.470	1.249	0.504	0.202	0.175	2.353	0.000
Winnipeg	3.448	1.056	1.671	1.211	0.496	0.284	0.051	0.288
Calgary	5.489	1.146	1.771	0.258	0.800	0.264	0.064	0.294
Vancouver	7.843	1.572	1.959	0.579	1.965	0.351	0.268	0.155
Victoria	10.386	0.375	1.335	0.463	0.865	0.105	0.056	0.109
Relative clustering index = [Nij / Nj] ÷ [Ni / N]								
CMA	**National origin group**							
	U.K.	Italy	Germany	Portugal	India	Greece	Finland	Jamaica
Montréal	0.251	1.145	0.421	0.728	0.415	1.582	0.144	0.400
Ottawa	0.811	0.452	0.733	0.606	0.729	0.305	0.288	0.509
Toronto	1.665	2.153	1.362	2.391	1.873	2.130	1.440	3.298
Kitchener	1.221	0.201	2.291	3.191	0.826	0.491	0.365	0.567
Thunder Bay	0.519	1.302	1.004	0.450	0.242	0.209	19.936	0.000
Winnipeg	0.706	0.308	1.342	1.081	0.596	0.338	0.436	0.457
Calgary	1.124	0.334	1.423	0.231	0.960	0.314	0.540	0.466
Vancouver	1.605	0.458	1.574	0.517	2.359	0.418	2.272	0.246
Victoria	2.126	0.109	1.073	0.413	1.038	0.125	0.472	0.173

5. Measures of demographic groups

The immigrant group is classified as the sample of foreign-born workers who come from demographic group *i*, live in metropolitan area *j*, and arrived in Canada in calendar year *k*. These demographic groupings are country of birth, ethnicity, language and visible minority status. The CMAs used are based on the 1981 Census definition.

Following the methodology of Borjas (2000), country of birth is used as the primary measure of residential segregation. However, language, ethnicity, and visible minority status are also examined. These additional definitions of demographic groups are included for two particular reasons. First, since the Canadian Censuses employed for the analysis do not have a question pertaining to the country of birth of the respondent's parents, members of a community who are not immigrants, but whose parents were born outside of Canada are unaccounted for when the indexes are calculated. Therefore, the proportion of an origin group will be underestimated. This miscalculation of the indexes will be especially pronounced for more traditional immigrant

groups and less pronounced for more recent immigrant groups. Therefore, ethnicity, language, and visible minority status will also be examined since the status of second generation Canadians can be calculated for these origin group variables.

A second consideration for including these extra measures arises when the country of birth is not necessarily a homogeneous group and therefore may not be an accurate representation of a "community". There are many incidences where people from the same country of birth may speak different languages, have different cultures and come from different ethnic backgrounds. For example, the former Yugoslavia was composed of several different ethnic linguistic groups. Furthermore, common culture, language and ethnicity may cross country boundaries. If people from the same country of birth speak different languages and people of different countries share a common language, the idea of a community based on country of birth is marginalized. Ethnicity will also be studied. In many cases, people from the same country of birth may come from ethnic groups that have ethnic conflicts and are unlikely to associate with each other (such as the Croatians and Serbians in the former Yugoslavia). Also, ethnicity is not confined to country borders, and people of the same ethnicity may come from different countries. For example, in the 1981 Census, there are over 100 different countries of birth reported by Jewish immigrants, including such diverse countries as Australia, Chile, Jamaica and Egypt.

While visible minority classifications may be too general to be viewed as a grouping, visible minority status may also provide some level of attachment and interaction not measured by ethnicity, country of birth or mother tongue and, therefore, will also be analyzed. While Cutler and Glaeser's 1997 American study examined the effect of black enclaves, regression analysis will be extended to include all identifiable visible minority groups as the affiliation measure (see Appendix 1). There is also a literature in Canada which finds an earnings disadvantage for visible minorities versus white males, which was especially true for visible minority male immigrants (Pendakur and Pendakur, 1998; Pendakur and Pendakur, 2002). After controlling for education, work experience and other demographic variables, Hum and Simpson (1999) find that black males are the only Canadian-born visible minority group to have a statistically significant negative wage differential. However, they do find a statistically significant negative wage disadvantage for several visible minority immigrant groups. Potentially, clustering of visible minority immigrant groups could account for some of this disadvantage if human capital accumulation and labour market opportunities are affected by clustering.

6. Model specification

The 1981, 1986, 1991 and 1996 one in five Canadian Census micro data files are employed to estimate the economic outcomes of male immigrants.[11] Initially, the economic outcome is defined as the wage growth of the immigrant cell (i,j,k) and is estimated with the following model:

$$(1) \qquad \Delta \log W_{ijk} = \alpha \log W_{ijk}(t_0) + \beta X_{ijk} + \delta S_{ij} + n_i + r_j + y_k + \mu_{ijk}$$

The dependent variable for the regression is the growth rate of the mean hourly wage of immigrants from group i, living in CMA j, from landing cohort k.[12] The regression is calculated over a five-, ten- and fifteen-year period when 1980 is the base year, a ten- and five-year period

11. The effect of ethnic neighbourhoods on the earnings of female immigrants is not studied due to the complex nature of female labour market decisions.

12. The hourly wage rate for each worker is calculated by dividing the total wage and salary of each worker by the product of the number of weeks worked in the reference year and the total number of hours worked in the reference week. Hourly wage = (total wages~salary)/(weeks worked × hours per week)

when 1985 is the base year and a five-year period when 1990 is the base year.[13] For the five-year growth model, the average log hourly wage earned by workers aged 18-59 in cell (i,j,k) was calculated for the base year in the respective Canadian Censuses, while the average log hourly wage was then calculated for the same cells aged 23-64 in the following Census. For the ten-year growth models, the average log hourly wage earned by workers aged 18-54 for the cell (i,j,k) is calculated for the initial year, while the average log hourly wage is then calculated for the same cells for the workers aged 28-64 ten years later. Finally, for the fifteen-year growth model, the initial average mean log wage level is calculated for the 18-49 age cells in 1980 and then for the same cells for workers between 33-64 years old in 1995. The standard errors for the regressions were corrected for heteroskedasticity using White's (1980) method. The regression is weighted by the total number of frequencies of all groups ($\sum F_{ijk}$) times the total of the Census weights for each group (W_{ijk}) divided by the total sum of weights for all of the groups ($\sum W_{ijk}$). This summed up over all groups equals $\sum F_{ijk}$.[14]. This re-weights the frequency weights by the proportion of the Census weights each cell comprises.

To be able to compare results with those of Borjas (2000) and to control for the demographic composition of the cells, education and age distribution variables were included in the regression. These demographic variables also control for some of the possible self-selection of immigrants into ethnic neighbourhoods. If immigrants do not settle randomly with respect to ability, the effect of ethnic neighbourhoods on wage growth may be biased. If older and less-educated immigrants have a higher propensity to reside in ethnic neighbourhoods then if a negative effect of ethnic neighbourhoods is found, these economic outcomes may not be caused by ethnic clustering, but may be attributable to the productivity of the immigrant. The education and age distribution variables control for the observable portion of the self-selection. For the educational attainment, the proportion of the cell with high school or less, trade-vocational school or college diploma and university diploma was calculated.[15] For the five-year growth models, the proportion of workers in the 26-36, 37-47 and 48-59 age groups were calculated, while in the ten-year growth model, the proportion in the 25-34, 35-44 and 45-54 age groups were calculated. For the fifteen-year growth models the proportion in the 25-33, 34-43 and 44-49 age categories were calculated. However, it is still possible that there remains uncontrolled self-selection based on non-observable qualities of immigrants. It is conceivable that immigrants with the same level of education and same age may still have different aptitudes for success in the Canadian labour market. For example, more risk-adverse immigrants may be drawn to ethnic neighbourhoods, while more industrious and risk-inclined immigrants may settle outside of ethnic neighbourhoods, where they will have a harder initial settlement, but where greater opportunities for labour market success may lay.

The effect of residential segregation on wage growth is represented by S_{ij}. When country of birth is employed as the affiliation measure, the model is rerun with S_{ij} entering as a quadratic. Following the methodology of Borjas (2000), fixed effects were employed to net out: regional labour market (r_j), cohort (y_k) and national origin (n_i) fixed effects. The national origin fixed effects will be replaced with ethnicity fixed effects (e_i), visible minority fixed effects (v_i) and language fixed effects (l_i) for the regressions based on the growth rate of the wage of ethnic, visible minority and language groups respectively. The cohort groups used for the regression are

13. The wages were converted into 1992 dollars using the CPI (Canadian Price Index).

14. Each group weight = $(\sum F_{ijk}) \times [W_{ijk}/\sum W_{ijk}]$. The sum of the total weights=$\sum [\sum F_{ijk} \times [W_{ijk}/\sum W_{ijk}]] = \sum F_{ijk}$ where $\sum [W_{ijk}/\sum W_{ijk}] = 1$. The results for country of birth for the five-, ten- and fifteen-year models, with 1980 as the base year, were rerun with the frequency as the weight. The results were found to be very similar to the results with the frequency re-weighted by the proportion of the Census weights a group composes.

15. Borjas used years of schooling, however this variable was not available in the 1981 Canadian Census.

denoted by the subscript k. The cohort landing groups are those who landed between 1975 and 1979, 1970 and 1974, 1965 and 1969, 1960 and 1964, 1950 and 1959 and those who landed before 1950 when 1980 is the base year. The cohort landing groups are pushed up by five and ten years when 1985 and 1990 are the base years respectively. Immigrants who landed in the base year are omitted from each regression analysis since the income reported in the Census is the income earned in the year of landing. This causes a disparity in the opportunity for labour market activity for immigrants who immigrated later in the base year.

For country of birth, ethnicity and mother tongue, the most numerous groups were utilized for the regression analysis.[16] For country of birth, following Borjas (2000), the largest 90 immigrant groups in the population studied were used. In the 1981 and 1986 Censuses, the top 90 groups made up over 99% of the working-age foreign-born male immigrant population in the geographical areas studied, and over 98% in 1991. There were 60 ethnic minority groups and 50 language minority groups analyzed. For these ethnic and language estimations, all distinct groups identifiable across Censuses and composing a weighted frequency of 200 or greater were included. All the visible minority groups were used except for "multiple groups", which is not included since it is not possible to determine the composition of the visible minority groups of respondents in this category.

For the analysis based on country of birth, immigrants are classified as having immigrated to Canada and having been born outside of Canada. For visible minority status, ethnicity and language, immigrants are classified by whether they immigrated to Canada or not. The regression is run for male immigrants who collect a salary or wage. The regression is rerun with growth in weekly earnings as the dependent variable since the calculation of hourly wage may be biased if the hours worked in the reference week is not representative of the average number of weekly hours worked over the reference year. The regression is also rerun with the growth in total earnings of workers as the dependent variable since a worker's income may come from non-wage, non-salary sources. Total earnings include earnings from wages and salaries, self-employment income and investment income. The growth in average total earnings is also examined.[17]

Convergence in employment rates is also examined. Focusing solely on wage convergence may not give an accurate picture of the effect of ethnic neighbourhoods on economic assimilation. Potentially, ethnic concentration may provide immigrants with more opportunities to find employment, however, the employment found within an ethnic neighbourhood may not be as desirable as the employment found outside the ethnic neighbourhood. If residing in an ethnic neighbourhood provides a better opportunity for employment than living outside the ethnic neighbourhood, but at lower wages, then a larger percent of the lower-skilled workers will be employed, depressing the average observed growth in the wage rate of a group. Outside the ethnic neighbourhood, if less-skilled workers have a more difficult time finding employment, then higher-skilled workers will be over-represented in the labour force, overstating the benefit of living outside an ethnic neighbourhood. The percentage of all working-age males actually employed may also give an indication of the availability of jobs if unemployment is hidden by the discouraged worker effect. Therefore, the change in total employment is examined.

16. The calculation of the most numerous group is based on the weighted number of working age males in the base year for the ten-year specification model. See Appendix 1 for groups included in the analysis.
17. For the regressions based on the growth rate of total earnings, individuals who do not work or who do not report any earnings are omitted from the estimation. For the regressions based on the growth rate of average total earnings, individuals who do not work or who do not report any earnings are assigned total earnings equal to 1.

7. Empirical results

Prior to estimating the effect of ethnic neighbourhoods on wage growth, it is beneficial to determine the effect of concentration on the initial wage level of immigrants, in order to gauge whether the effect of ethnic neighbourhoods on wage growth occurs from a point of higher or lower initial wage. Using pooled data from the most recent landing cohorts from the 1981, 1986, 1991 and 1996 Censuses, the following equation is estimated:

$$(2) \quad \log W_{ijt} = \beta X_{ijt} + \delta_0 S_{ijt} + \delta_1 C_t \ [+ \delta_2 \{S_{ijt} \times C_t\}] + n_i + r_j + \mu_{ijt}$$

Equation (2) is similar to equation (1) except that the dependent variable is now the initial mean log wage W_{ijt}.[18] Also, since only the most recent landing cohort from each Census was used, the landing cohort fixed effect y_k, is replaced by C_t, where C_t is a set of dummies that indicate the time period of arrival. For the 1981 Census, the 1975-1979 immigrant cohort is examined, while for the 1986 Census, the 1980-1984 cohort is examined. For the 1991 Census, the 1985-1989 cohort is used, while for the 1996 Census, the 1990-1994 cohort is employed. In addition to controlling for quality differences of cohorts, C_t also controls for macroeconomic conditions that might affect entry wages of immigrants. Equation (2) is re-estimated with the cohort dummies interacted with the indexes ($\delta_2\{S_{ijt} \times C_t\}$) to determine if the effect of ethnic neighbourhoods on entry wages has changed over time for the various entry cohorts.

Table B: Country of birth, initial mean wage

	Exposure Index	Exposure Index	Relative Index	Relative Index
R^2	0.5958	0.5966	0.5937	0.5944
C_{8084}	-0.1699***	-0.1890***	-0.1685***	-0.1635***
	(0.011)	(0.013)	(0.012)	(0.020)
C_{8589}	-0.0864***	-0.0972***	-0.0856***	-0.1063***
	(0.012)	(0.014)	(0.012)	(0.021)
C_{9094}	-0.2552***	-0.2608***	-0.2588***	-0.2820***
	(0.012)	(0.014)	(0.012)	(0.020)
Index	-1.4852***	-1.7551***	0.0018	-0.0043
	(0.444)	(0.465)	(0.004)	(0.007)
Index × C_{8084}		1.2336***		-0.0033
		(0.436)		(0.009)
Index × C_{8589}		0.6468		0.0115
		(0.703)		(0.010)
Index × C_{9094}		0.2637		0.0127
		(0.553)		(0.008)

Significance levels are indicated by (*) for 10%, (**) for 5% and (***) for 1%.
Standard errors are in brackets.

18. Each cell in the pooled regression is weighted again using the total frequencies re-weighted by the proportion of the total sum of Census weights that each cell comprises. This is done independently for each cross section to prevent over-weighting the cross sections with less frequencies and under-weighting the cross sections with more frequencies. The pooled regressions were rerun using simple frequencies as the weights with little change in the magnitude in the coefficients and no change in the level of statistical significance.

Examining Table B, the relative index for the pooled model is positive but not statistically significant. However, the exposure index is negative and statistically significant at the 1% level indicating evidence that ethnic neighbourhoods may have a negative initial impact on wage levels. In the second column of Table B, the exposure index is interacted with the cohort dummies, with the cohort for the 1981 Census as the reference category. The exposure index for the base cohort is negative and statistically significant at the 1% level. The other three cohorts are less negative, but only the cohort for the 1986 Census (C_{8084}), is statistically different from the exposure index for the base year.

7.1 Growth of mean wage

The model that Borjas (2000) called the "most complete specification" is employed. The complete specification regression includes fixed effects for cohort, metropolitan area and country of birth. The exposure and relative clustering indexes are statistically significant and negative for the ten-year growth model with 1980 as the base year (second column of Table C), which concurs with Borjas' (2000) findings. These indexes are also statistically significant and negative for the five- and fifteen-year growth models. Therefore, ethnic neighbourhoods based on country of birth have a negative impact on wage growth. Further, the magnitude of the negative effect of exposure index is around twice as large as what Borjas (2000) found in the United States over the same period.[19] With a ten-year growth model spanning 1980 to 1990 and fixed effects controlling for country of birth, landing cohort and metropolitan area, Borjas (2000) obtained a coefficient of -0.369.

The five- and ten-year growth models with 1985 as the base year and the five-year growth model with 1990 as the base year are also statistically significant at the 5% level for the exposure index (see Table D). For the relative index, the results are negative and statistically significant at the 10% level for the five-year growth model with 1985 as the base year, and negative and statistically significant at the 1% level for the ten-year growth model when 1985 is the base year, and for the five-year growth model with 1990 as the base year. The magnitude of the results is also fairly consistent across the different time lengths and base years and therefore appear robust to different macro conditions. The results indicate that a 1% increase in exposure to one's own group causes a decrease in the wage growth of somewhere between 0.70% and 0.95%.

7.2 Movement of workers

Movement of workers is one issue that is difficult to address using the Census. However, the results may be affected by migration of workers. For a given cell, if above-average skilled workers from group A move from an area with a low concentration of the same group into an area with a higher proportion of individuals of group A, the coefficient of the index will be biased upwards. Conversely, if below-average skilled workers move from less concentrated to more concentrated neighbourhoods, or high-skilled workers move from high concentrated to less concentrated neighbourhoods, a downward bias on the coefficient of the index will occur. In an attempt to control for and test the magnitude of this problem, Borjas (2000) re-estimated his

19. These results were found to be robust when the model is rerun using full-time workers instead of using workers with positive wages. The exposure index was also found to be negative and statistically significant for each of the five- ten- and fifteen-year growth models for country of birth when full-time workers were examined.

Table C: Country of birth, growth of mean wage, 1980 base year

Period of growth	1980-85	1980-90	1980-95	1980-85	1980-90	1980-95
(I)						
R^2	0.3797	0.4731	0.3661	0.3657	0.4725	0.3677
Initial log wage	-0.7618***	-0.8361***	-0.8000***	-0.7482***	-0.8480***	-0.8374***
	(0.022)	(0.023)	(0.026)	(0.022)	(0.025)	(0.029)
Exposure index	-0.8080***	-0.7096**	-0.7274**	-0.8053***	-0.9470***	-0.8252**
	(0.241)	(0.291)	(0.331)	(0.239)	(0.309)	(0.350)
(II)						
R^2	0.3787	0.4723	0.367	0.3650	0.4706	0.3689
Initial log wage	-0.7579***	-0.8329***	-0.7976***	-0.7437***	-0.8426***	-0.8346***
	(0.023)	(0.023)	(0.026)	(0.023)	(0.025)	(0.028)
Relative index	-0.0087***	-0.0063**	-0.0135***	-0.0100***	-0.0074**	-0.0156***
	(0.003)	(0.003)	(0.005)	(0.003)	(0.003)	(0.005)
(III)						
R^2	0.3804	0.4743	0.3669	0.3670	0.4735	0.3691
Initial log wage	-0.7637***	-0.8393***	-0.8026***	-0.7499***	-0.8500***	-0.8392***
	(0.022)	(0.023)	(0.026)	(0.022)	(0.024)	(0.029)
Exposure index	-1.9512***	-2.5233***	-2.5008**	-2.3830***	-2.6284***	-3.0327***
	(0.672)	(0.736)	(1.041)	(0.685)	(0.770)	(1.098)
$Exposure^2$	11.6172*	18.4777***	18.1088*	15.9752**	17.0711***	22.4705**
	(6.266)	(6.496)	(9.699)	(6.355)	(6.648)	(10.008)
(IV)						
R^2	0.3789	0.4729	0.3677	0.3655	0.4712	0.3699
Initial log wage	-0.7580***	-0.8332***	-0.7977***	-0.7438***	-0.8428***	-0.8348***
	(0.023)	(0.023)	(0.026)	(0.023)	(0.025)	(0.028)
Relative index	-0.0121**	-0.0137***	-0.0223***	-0.0157***	-0.0145***	-0.0267***
	(0.005)	(0.005)	(0.008)	(0.005)	(0.005)	(0.008)
$Relative^2$	0.0004	0.0008***	0.001**	0.0006*	0.0008**	0.0013***
	(0.0003)	(0.0003)	(0.0005)	(0.0003)	(0.0004)	(0.0005)
Movers excluded	NO	NO	NO	YES	YES	YES

Significance levels are indicated by (*) for 10%, (**) for 5% and (***) for 1%.
Standard errors are in brackets.

model after omitting workers who had moved into the CMA within the previous five years of the second Census. Comparing these results to his original model, he found little difference in the results. However, Borjas notes that since his model was based on a ten-year growth, there was still a five-year period in which one could not control for migration.

To examine this problem, the regressions with country of birth as the affiliation indicator are re-estimated excluding individuals who have not been living in the CMA in the five years before the later time period of the growth model. Being able to calculate a five-year growth model for each of the three base year models, we should get an accurate picture of the severity of the potential bias that the mobility of workers creates. After controlling for mobility, the results are still statistically significant and strongly negative. Only the 1985-95 growth model (the 4^{th} column of Table D) is below the 5% level but is significant at the 10% level with a p value of 0.051. The other models are still statistically significant at the 5% or 1% level. When 1980 is

Table D: Country of birth, growth of mean wage, 1985 and 1990 base years

Period of growth	1985-90	1985-95	1985-90	1985-95		1990-95	1990-95
(I)					(I)		
R^2	0.4744	0.4294	0.4328	0.4072	R^2	0.3748	0.351
Initial log wage	-0.7904***	-0.8044***	-0.7906***	-0.7834***	Initial log wage	-0.8170***	-0.8152***
	(0.019)	(0.021)	(0.021)	(0.023)		(0.020)	(0.022)
Exposure index	-0.7209**	-0.8087**	-0.8095**	-0.7188*	Exposure index	-0.9288**	-0.7706**
	(0.305)	(0.355)	(0.335)	(0.369)		(0.372)	(0.3885)
(II)					(II)		
R^2	0.4737	0.4295	0.4321	0.4073	R^2	0.3747	0.3508
Initial log wage	-0.7889***	-0.8032***	-0.7888***	-0.7823***	Initial log wage	-0.8151***	-0.8135***
	(0.019)	(0.022)	(0.021)	(0.023)		(0.019)	(0.022)
Relative index	-0.0051*	-0.0097***	-0.0064**	-0.0087**	Relative	-0.0078***	-0.0063**
	(0.003)	(0.004)	(0.003)	(0.004)		(0.003)	(0.003)
(III)					(III)		
R^2	0.4747	0.4295	0.4330	0.4074	R^2	0.3748	0.3510
Initial log wage	-0.7901***	-0.8041***	-0.7903	-0.7830***	Initial log wage	-0.8170***	-0.8152***
	(0.019)	(0.021)	(0.021)	(0.023)		(0.020)	(0.022)
Exposure index	-1.7088**	-1.3054	-1.6582**	-1.5467*	Exposure index	-1.1924	-1.2606
	(0.705)	(0.842)	(0.762)	(0.866)		(0.835)	(0.880)
$Exposure^2$	12.4308	6.2565	10.6773	10.4283	$Exposure^2$	4.3382	8.0619
	(7.865)	(9.382)	(8.651)	(9.612)		(12.142)	(12.803)
(IV)					(IV)		
R^2	0.4741	0.4298	0.4325	0.4078	R^2	0.3749	0.3511
Initial log wage	-0.7887***	-0.8028***	-0.7886***	-0.7818***	Initial log wage	-0.8155***	-0.8139***
	(0.019)	(0.022)	(0.021)	(0.023)		(0.020)	(0.022)
Relative index	-0.0111**	-0.0161***	-0.0127**	-0.0162***	Relative index	-0.0117***	-0.0106**
	(0.005)	(0.006)	(0.005)	(0.005)		(0.004)	0.005)
$Relative^2$	0.0008**	0.0008	0.0008**	0.0009*	$Relative^2$	0.0004	0.0004
	(0.0003)	(0.0005)	(0.0004)	(0.0006)		(0.0003)	(0.0003)
Movers excluded	NO	NO	YES	YES	Movers excluded	NO	YES

Significance levels are indicated by (*) for 10%, (**) for 5% and (***) for 1%.
Standard errors are in brackets.

the base year, for the five-year model the coefficient for the exposure index becomes only slightly less negative (see the 4th column of Table C). With 1985 as the base year, the coefficient on the exposure index becomes more negative, while with 1990 as the base year, the negative impact of exposure decreases, but still remains strongly negative. While omitting the migrants solves the problem for the five-year growth model, there still remains a five- and ten-year period for which there might have been migration in the ten- and fifteen-year growth models, giving less confidence in these regressions. For the ten- and fifteen-year growth models with 1980 as the base year, there was an upward bias, while for the ten-year growth model with 1985 as the base year, there was a slight downward bias. Overall, it appears little bias exists, and the direction of the bias is indeterminate.

7.3 Square of exposure and relative indexes

Equation (1) with country of birth as the affiliation group is re-estimated with the indexes also entered as a quadratic, given by:

$$(3) \qquad \Delta \log W_{ijk} = \alpha \log W_{ijk}(t_0) + \beta X_{ijk} + \delta S_{ij} + \Psi S_{ij}^2 + n_i + r_j + y_k + \mu_{ijk}$$

When the square of the exposure index is added to the regression, it is found to be positive and statistically significant when 1980 is the base year. From Table C section (III), the square of exposure index is statistically significant at least at the 5% level for columns 2, 4, 5 and 6 and at the 10% level for the remaining two columns for the regressions with 1980 as the base year. This indicates that at low levels of concentration, an increase in the level of concentration has an additional negative impact on mean wage growth but at a decreasing rate. This occurs until the exposure index is somewhere between 0.068 and 0.084. So when a group i constitutes around 7% or 8% of a CMA j, an increase in the percent of a CMA that a group comprises will have a positive impact on the growth of wages. However, only around 1% of the groups i make up more than 7% of a CMA population j. Therefore, the quadratic to the right of the turning point can be ignored in the regressions indicating that at low levels of concentration, an additional member to the group has a negative impact on wage growth at a decreasing rate. For the regressions with 1985 and 1990 as the base years, the square of the exposure index is still positive, but not statistically significant.

The square of the relative index is also positive. It is statistically significant at least at the 5% level for the ten- and fifteen-year growth models with 1980 as the base year, and for the five-year growth model with 1985 as the base year. The turnaround occurs when the relative index is somewhere between 7 and 15. The right of the turnaround can also be ignored for the relative index since over 99% of groups have relative indexes below the turnaround point in each regression. Therefore, the square of the relative index also indicates that the negative impact of concentration occurs at a decreasing rate.

7.4 Employment

Before examining the effect of ethnic neighbourhoods on the change in employment rates, it is useful to determine the effect of ethnic neighbourhoods on initial employment levels. To determine the effect of ethnic neighbourhoods on the entry employment rates, equation (2) is re-estimated with the rate of employment as well as total employment as the dependent variables. The rate of employment is defined as the total number of people employed, divided by the total number of people in the labour force for a given cell. Total employment gives the percentage of the cell in the given age group that is employed. While the relative index is not statistically significant for either specification, the exposure index is negative and statistically significant, indicating a negative impact of ethnic neighbourhoods on both the entry employment and entry total employment rates.

No convincing evidence was found to suggest that ethnic neighbourhoods affect the change in employment or change in total employment rates of the cells after controlling for the initial rate of employment. For the change in rate of employment, the only statistically significant results occur with the exposure index for the ten-year model in column 2 of Table F with a negative result and for the relative index for the five-year model in column 1 of Table F which is positive. For the total employment model, the only statistically significant result is for the relative index for the five-year growth model, which is positive. The indexes of concentration do not appear to be able to predict changes in employment rates or total employment.

Table E: Country of birth, initial employment for most recent cohort

	Employment				Total employment			
	Exposure Index	Exposure Index	Relative Index	Relative Index	Exposure Index	Exposure Index	Relative Index	Relative Index
R^2	0.4947	0.4957	0.4925	0.4928	0.6548	0.6559	0.6512	0.6522
C_{8084}	-0.0389***	-0.0434***	-0.0383***	-0.0402***	0.0157**	0.0198***	0.0168**	0.0087
	(0.005)	(0.006)	(0.005)	(0.008)	(0.007)	(0.008)	(0.007)	(0.011)
C_{8589}	-0.1013***	-0.1092***	-0.1009***	-0.0994***	-0.1192***	-0.1283***	-0.1184***	-0.1159***
	(0.006)	(0.006)	(0.006)	(0.009)	(0.007)	(0.008)	(0.008)	(0.011)
C_{9094}	-0.0942***	-0.1010***	-0.0956***	-0.0893***	-0.1604***	-0.1582***	-0.1631***	-0.1507***
	(0.006)	(0.006)	(0.006)	(0.009)	(0.008)	(0.009)	(0.009)	(0.013)
Index	-0.6180***	-0.8447***	0.0003	0.0016	-1.1492***	-1.0739***	-0.0030	-0.0006
	(0.182)	(0.167)	(0.002)	(0.003)	(0.238)	(0.237)	(0.003)	(0.004)
Index × C_{8084}		0.2853*		0.0011		-0.3080		0.0048
		(0.160)		(0.004)		(0.215)		(0.006)
Index × C_{8589}		0.5720		-0.0009		0.7070*		-0.0016
		(0.376)		(0.005)		(0.428)		(0.006)
Index × C_{9094}		0.4500		-0.0035		-0.1675		-0.0068
		(0.302)		(0.004)		(0.415)		(0.006)

Significance levels are indicated by (*) for 10%, (**) for 5% and (***) for 1%.
Standard errors are in brackets.

7.5 Other specifications of the dependent variables

Using hourly wage as the dependent variable may cause a measurement error since hourly wage is constructed by dividing total wage and salary earnings by the product of the weeks worked in the reference year times the number of hours worked in the reference week. If the reference week is not typical of the mean weekly hours, then the constructed hourly wage may not accurately represent the true hourly wage. To examine this potential bias, the regressions with country of birth as the affiliation grouping and 1980 as the base year were rerun with weekly earnings as the dependent variable. Weekly earnings are constructed by dividing yearly wage and salary earnings in the reference year by weeks worked. Looking at Table G, the results are very similar to those presented in Table C for the five- and ten-year hourly wage growth models for the exposure index and for all three hourly wage growth models for the relative index. The only discrepancy occurs with the exposure index for the fifteen-year growth model where the coefficient on the exposure index is not statistically significant and is half the magnitude of the coefficient for growth of mean wage over the same period.

To further examine the sensitivity of the results to the specification of the dependent variable, total earnings are also examined. If workers receive income from non-wage/non-salary sources, the hourly wage may not give a complete story of the impact of ethnic neighbourhoods on labour market assimilation. The growth in total earnings is examined with 1980 as the base year in columns 1 - 3 of Table H for workers with positive earnings. While the exposure index for the five-year growth model is statistically insignificant and the relative index is positive, the ten- and fifteen-year growth models indicate statistically significant and very large negative effects of ethnic concentration on the growth of earnings.

Table F: Change in the rate of employment and total employment rate, 1980 base year

	Employment			Total employment		
Period of change	1980-85	1980-90	1980-95	1980-85	1980-90	1980-95
(I)						
R^2	0.5038	0.3735	0.4154	0.6186	0.5830	0.5832
Initial rate	-0.9544***	-0.9448***	-0.9202***	-0.9609***	-0.9290***	-0.9610***
	(0.021)	(0.027)	(0.026)	(0.016)	(0.025)	(0.027)
Exposure index	0.0282	-0.1982**	-0.0375	0.0262	-0.1270	-0.1851
	(0.072)	(0.081)	(0.105)	(0.072)	(0.162)	(0.163)
(II)						
R^2	0.5056	0.3727	0.4159	0.6201	0.5828	0.5830
Initial rate	-0.9538***	-0.9443***	-0.9200***	-0.9603***	-0.9293***	-0.9614***
	(0.021)	(0.027)	(0.026)	(0.016)	(0.025)	(0.027)
Relative index	0.0038**	0.0006	0.0019	0.0038**	-0.0009	-0.0012
	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)

Significance levels are indicated by (*) for 10%, (**) for 5% and (***) for 1%.
Standard errors are in brackets.

Table G: Growth in total mean log weekly earnings, 1980 base year

Period of growth	1980-85	1980-90	1980-95
(I)	All workers	All workers	All workers
R^2	0.4116	0.5083	0.4169
Initial total log earnings	-0.7394***	-0.8237***	-0.7783***
	(0.023)	(0.024)	(0.030)
Exposure index	-0.7006***	-0.7400***	-0.4096
	(0.246)	(0.282)	(0.337)
(II)			
R^2	0.4117	0.5075	0.4181
Initial total log earnings	-0.7371***	-0.8207***	-0.7774***
	(0.023)	(0.024)	(0.030)
Relative index	-0.0099***	-0.0067***	-0.0118**
	(0.003)	(0.003)	(0.005)

Significance levels are indicated by (*) for 10%, (**) for 5% and (***) for 1%. Standard errors are in brackets.

Table H: Growth in total earnings, 1980 base year

Period of growth	1980-85	1980-90	1980-95	1980-85	1980-90	1980-95
(I)	All workers	All workers	All workers	All cell members	All cell members	All cell members
R^2	0.3515	0.4374	0.4300	0.4600	0.5821	0.5375
Initial total log earnings	-0.5666***	-0.8154***	-0.7005***	-0.8069***	-0.9349***	-0.9365***
	(0.056)	(0.053)	(0.070)	(0.025)	(0.024)	(0.029)
Exposure index	-1.1729	-2.5624**	-4.0614***	-1.1616	-2.5714**	-4.1117***
	(0.847)	(1.017)	(1.236)	(0.827)	(1.013)	(1.255)
(II)						
R^2	0.3511	0.4366	0.4287	0.4598	0.5814	0.5364
Initial total log earnings	-0.5622***	-0.8083***	-0.6925***	-0.8045***	-0.9336***	-0.9349***
	(0.056)	(0.053)	(0.070)	(0.025)	(0.024)	(0.029)
Relative index	0.0037	-0.0235**	-0.0377***	0.0079	-0.0211*	-0.0367***
	(0.011)	(0.011)	(0.013)	(0.011)	(0.011)	(0.014)

Significance levels are indicated by (*) for 10%, (**) for 5% and (***) for 1%.
Standard errors are in brackets.

However, while examining total earnings rather than wages and salaries covers a larger portion of the working age population, a bias may still exist. Looking only at employed workers may give a misleading view of the effect of ethnic neighbourhoods on labour market outcomes if ethnic concentration also affects the likelihood of finding employment.

In columns 4 - 6 of Table H, all working age males in a cell are included. These results give an indication of the effect of ethnic neighbourhoods on the overall earning opportunities. If better employment is available outside of an ethnic neighbourhood, but a smaller proportion of immigrants actually find work, the estimated effect of ethnic concentration on earnings growth will be misleading. However, such a bias does not appear to exist. Examining columns 4 - 6 of Table H, the results are similar to the results with only workers with positive earnings, with the impact of ethnic concentration on growth of earnings becoming increasingly negative over the longer growth models.

7.6 Other measures of residential segregation

When the country of birth is replaced by ethnicity or mother tongue as the affiliation index in equation (1), there is still evidence of the negative impact of clustering on wage growth. The exposure index for ethnicity and mother tongue are statistically significant at either the 5% or 1% levels for the five- and ten-year growth models with 1980 as the base year (columns 1, 2, 4 and 5 of Table I). The exposure index for the fifteen-year growth models are both negative, but only statistically significant at the 10% level for mother tongue and not statistically significant for ethnicity (columns 6 and 3 of Table I). The relative index coefficients for these two affiliation measures are negative, but not statistically significant.

Table I : Ethnicity and mother tongue, 1980 base year

Period of growth	1980-85	1980-90	1980-95	1980-85	1980-90	1980-95
(I)	Ethnicity	Ethnicity	Ethnicity	Language	Language	Language
R^2	0.3536	0.4570	0.4145	0.3467	0.4670	0.4201
Initial log wage	-0.7686***	-0.7955***	-0.8231***	-0.7308***	-0.7847***	-0.7698***
	(0.030)	(0.032)	(0.036)	(0.030)	(0.030)	(0.036)
Exposure index	-0.3060**	-0.3119**	-0.2660	-0.6652***	-0.4331**	-0.6202*
	(0.129)	(0.125)	(0.204)	(0.224)	(0.216)	(0.329)
(II)						
R^2	0.3527	0.4564	0.4142	0.3445	0.4663	0.4196
Initial log wage	-0.7674***	-0.7934***	-0.8219***	-0.7315***	-0.7844***	-0.7701***
	(0.030)	(0.032)	(0.036)	(0.030)	(0.030)	(0.036)
Relative index	-0.0035	-0.0041	-0.0039	-0.0035	-0.0020	-0.0062
	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)

Significance levels are indicated by (*) for 10%, (**) for 5% and (***) for 1%.
Standard errors are in brackets.

Convincing evidence of clustering effects is not found when visible minority status is applied as the affiliation measure. While the exposure index for the ten-year growth model with visible minority as the affiliation measure is statistically significant and resembles the magnitude of Borjas' (2000) results for country of birth, the results are not robust to changes in the length of the time periods of the model. The rest of the results for the five- and fifteen-year models are not statistically significant and the exposure index for the fifteen-year growth model is positive. These regressions are rerun with non-visible minorities removed. Potentially, the inclusion of non-visible minorities could affect the results if clustering does not have an impact on the labour market outcomes of non-visible minorities. The results for the regressions with non-visible minorities excluded are shown in columns 4 - 6 of Table J. Even with the non-visible minorities removed, the results still do not follow the trend of the results when country of birth, ethnicity or language were used as the affiliation measures. The coefficients for both the exposure and relative indexes are all positive and not statistically significant at the 5% level. Only the exposure index for the ten-year growth model is negative, but is no longer statistically significant. A possible explanation is that visible minority groups are too broad of a grouping to measure ethnic networks and that interaction occurs at a less broad level of classification.

7.7 Similar countries

It is likely that the impact of residential segregation should differ for countries that are similar to Canada versus countries that are very culturally different from Canada. Borjas (2000) included Australia, Canada, Ireland, New Zealand and the United Kingdom in his study. However, it is presumable that ethnic concentrations should not have an impact on the labour market assimilation of immigrants from countries that are similar to the host country. The results of country of birth regressions are re-examined in Table K where the exposure is interacted with regional dummy variables. The similar country dummy is used as the reference variable. The countries classified as being similar to Canada include the U.K., the U.S., Ireland, New Zealand and Australia for English or bilingual CMAs and France for French or bilingual CMAs.[20] Otherwise, these countries are included in the Western-Southern European index. Surprisingly, there does not

20. Bilingual CMAs include Saint John, Montréal and Ottawa–Hull. French CMAs include all CMAs in Quebec except for Montréal, while all other CMAs are classified as being English CMAs.

Table J: Visible minority, growth of mean wage, 1980 base year

Period of growth	1980-85	1980-90	1980-95	1980-85	1980-90	1980-95
(I)	All groups	All groups	All groups	Only visible minorities	Only visible minorities	Only visible minorities
R^2	0.4380	0.6013	0.4547	0.4259	0.4778	0.3851
Initial log wage	-0.6070***	-0.6407***	-0.7462***	-0.7742***	-0.7025***	-0.8382***
	(0.054)	(0.056)	(0.083)	(0.064)	(0.070)	(0.091)
Exposure index	-0.1267	-0.3142**	0.0005	0.4811	-0.0089	0.0692
	(0.134)	(0.136)	(0.178)	(0.582)	(0.763)	(0.923)
(II)						
R^2	0.4375	0.5996	0.4552	0.4281	0.4778	0.3859
Initial log wage	-0.6091***	-0.6368***	-0.7510***	-0.7792***	-0.7027***	-0.8436***
	(0.054)	(0.056)	(0.083)	(0.063)	(0.070)	(0.091)
Relative index	0.0041	-0.0102	0.0073	0.0153*	0.0001	0.0121
	(0.007)	(0.007)	(0.009)	(0.009)	(0.012)	(0.013)

Significance levels are indicated by (*) for 10%, (**) for 5% and (***) for 1%.
Standard errors are in brackets.

Table K: Controlling for similar countries of birth

Period of growth	1980-85	1980-90	1980-95	1985-90	1985-95	1990-95
R^2	0.3819	0.4767	0.3672	0.4760	0.4300	0.3767
Initial log wage	-0.7623***	-0.8387***	-0.7884***	-0.7925***	-0.8054***	-0.8180***
	(0.022)	(0.022)	(0.027)	(0.019)	(0.021)	(0.019)
Exposure index	-1.0412***	-1.0920**	-0.4065	-1.0991**	-0.8900*	-1.2219**
	(0.315)	(0.419)	(0.415)	(0.445)	(0.498)	(0.512)
Expo*(W/S Euro)	0.5318	0.7624*	-0.4989	0.7375	0.1522	0.4201
	(0.384)	(0.454)	(0.531)	(0.505)	(0.631)	(0.722)
Expo*(E Euro)	-3.4394	3.701	0.8898	-2.2267	-0.1987	-3.996
	(2.721)	(4.017)	(5.479)	(3.580)	(4.721)	(3.647)
Expo*(C/S America +Caribbean)	-2.7051	-4.6271**	-4.0866**	-2.1458	-1.76	-0.7666
	(1.980)	(2.258)	(1.968)	(1.510)	(1.555)	(1.340)
Expo*(Africa + Middle East)	-13.9039*	5.0971	-15.1051	4.651	-8.6634	-9.0681
	(7.863)	(10.759)	(11.271)	(9.639)	(10.553)	(6.158)
Expo*(S Asia)	-3.3576	-5.0922	-4.5312*	-2.9128	-1.3016	-0.6747
	(2.434)	(3.347)	(2.513)	(2.572)	(2.140)	(1.409)
Expo*(SE Asia)	-0.2017	3.5413	-2.138	3.0047	-0.1525	-0.3244
	(2.615)	(3.717)	(4.489)	(3.094)	(2.273)	(1.828)
Expo*(East Asia)	-1.7132	1.6007	-8.9797	1.2349	1.9292	2.6294**
	(3.783)	(3.400)	(10.461)	(1.634)	(1.657)	(1.170)

Significance levels are indicated by (*) for 10%, (**) for 5% and (***) for 1%.
Standard errors are in brackets.

Table L : Country of birth, exposure index interacted with cohorts

Period of growth	1980-85	1980-90	1980-95	1985-90	1985-95	1990-95
	t=0	t=0	t=0	t=5	t=5	t=10
R^2	0.3839	0.4757	0.3691	0.4781	0.4340	0.3783
Initial log wage	-0.7739***	-0.8479***	-0.8139***	-0.8034***	-0.8200***	-0.8249***
	(0.023)	(0.023)	(0.026)	(0.019)	(0.022)	(0.019)
Exposure index	-1.6064***	-1.3161**	-1.8641**	-0.8933**	-1.6391***	-1.8112***
	(0.353)	(0.574)	(0.733)	(0.400)	(0.465)	(0.448)
Cohort(1975+t~ 1979+t)*index	1.7917***	1.7107***	2.3005***	1.8825***	2.3562***	2.6002***
	(0.353)	(0.544)	(0.743)	(0.474)	(0.534)	(0.804)
Cohort(1970+t~ 1974+t)*index	1.1685***	0.6608	1.7136**	1.1445***	2.0935***	1.2965**
	(0.340)	(0.530)	(0.702)	(0.370)	(0.409)	(0.567)
Cohort(1965+t~ 1969+t)*index	0.4601	0.5228	1.1234	-0.0756	1.5771***	1.8446***
	(0.306)	(0.519)	(0.714)	(0.339)	(0.389)	(0.438)
Cohort(1960+t~ 1964+t)*index	0.8621**	0.2697	1.0412	-0.0123	0.7127*	1.3213***
	(0.342)	(0.541)	(0.730)	(0.335)	(0.367)	(0.467)
Cohort(1950+t~ 1959+t)*index	0.8524***	0.6394	0.8711	-0.0225	0.3724	0.4731
	(0.300)	(0.518)	(0.703)	(0.329)	(0.345)	(0.361)

Significance levels are indicated by (*) for 10%, (**) for 5% and (***) for 1%.
Standard errors are in brackets.

appear to be a consistent statistically significant difference between similar countries and most of the other regions.

The coefficient for the interaction between the exposure and the Central American, South American and Caribbean region is large, negative and statistically significant at the 5% level for the ten- and fifteen-year growth models with 1980 as the base year. The only other region that is significantly different statistically at the 5% level from the similar countries is the East Asian for the five-year growth model with 1990 as the base year. However, overall there are not many statistically significant differences between the effect of exposure on similar and the non-similar countries.

Potentially, this could be explained if there are some cultural differences between the general population and countries that are thought of as being "similar" to Canada. Immigrants from these countries may be more able to absorb the labour market skills from contact with the native-born Canadian population and therefore, may still obtain benefits from reduced exposure of their own group. As well, since linguistic and cultural differences between the general population and immigrants from similar countries are less pronounced, these immigrants may prosper more from the networking benefits available outside of their ethnic community than immigrants from non-similar countries.

7.8 Cohort effect

It is conceivable that living in his/her ethnic community may have divergent effects on different landing cohorts. In Table L, the exposure index is interacted with cohort dummies. The results indicate that the negative effects of ethnic clustering are strongest for the earlier cohorts. These results are contrary to Borjas' findings where he found that enclaves were most harmful for newly-arrived immigrants. Using the earliest cohort as the reference variable, the exposure index is strongly negative and statistically significant at either the 5% or 1% level for each of the regressions. Further, the effects of the living in his/her ethnic community are positive for the most recent cohort for each of the three base years.

However, recall from Table B, that newly-arrived immigrants living in their ethnic community tended to start at a lower initial wage. When 1985 and 1990 are the base years, the effect of the exposure to one's own country of birth group on wage growth is very large for the 1980-84 and 1985-89 cohorts, respectively. For example, for the five-year growth model for the 1980-1984 cohort with 1985 as the base year (column 4 of Table L), the interaction coefficient is 1.883, compared to -0.893 for the reference category which is immigrants who landed before 1955. This indicates a positive effect of residential segregation on growth of mean wage of around one for the 1980-1984 cohort.

8. Conclusion

This paper finds evidence of a negative impact of ethnic neighbourhoods on several labour market outcomes of immigrants. It is found that ethnic clustering has a negative influence on the entry wages of landing cohorts, but has a positive effect on the wage growth of these landing cohorts. However, overall, ethnic neighbourhoods are found to have a negative impact on the wage growth of immigrants in Canada. Several specifications of the model were examined to determine the robustness of the results. The findings are robust for different time periods and different specifications of time lengths of the growth model. As well, when country of birth is replaced by mother tongue or ethnicity as the affiliation measure, there is still evidence of a negative impact of clustering. The five-year model is particularly useful in examining the bias that movement of workers has on the results. Even after re-estimating the model to remove workers who had moved in the previous five years, the negative impact of ethnic neighbourhoods remained. Surprisingly, there is no strong evidence to suggest that residing in an ethnic neighbourhood has a divergent effect on the wage growth of immigrants from countries similar to the host country versus countries that are not similar to the host country.

Appendix 1

A.1 : Country of birth, working age males (18-54) in CMAs, weighted frequency					
Base year: 1980		Base year: 1985		Base year: 1990	
United Kingdom	163,653	United Kingdom	157,618	United Kingdom	141,208
Italy	137,433	Italy	117,350	Italy	94,961
Germany	46,626	Portugal	49,137	India	59,064
Portugal	45,599	India	44,375	Hong Kong	54,437
U.S.A.	39,170	U.S.A.	40,374	Portugal	53,916
India	36,047	Germany	42,587	Vietnam	42,542
Greece	35,608	China	31,234	U.S.A.	40,073
Yugoslavia	29,637	Greece	31,229	China	39,845
Netherlands	26,396	Hong Kong	29,180	Poland	37,869
Jamaica	22,267	Jamaica	28,669	Philippines	35,366
Hong Kong	21,220	Vietnam	28,037	Germany	34,248
Poland	19,332	Yugoslavia	27,156	Jamaica	32,220
Philippines	18,056	Netherlands	24,939	Greece	25,640
Taiwan	16,756	Philippines	23,490	Yugoslavia	24,000
France	16,121	Poland	22,971	Guyana	23,372
China	15,603	Guyana	17,544	Lebanon	21,477
Hungary	15,476	France	16,050	Netherlands	19,328
Vietnam	15,063	Trinidad & Tobago	14,334	Trinidad & Tobago	17,121
Trinidad & Tobago	13,564	Hungary	13,290	France	15,211
Guyana	12,645	Haiti	10,235	Haiti	13,023
USSR	11,617	Lebanon	9,856	Iran	12,793
Czechoslovakia	9,628	Czechoslovakia	9,590	South Korea	10,838
Haiti	9,301	USSR	9,049	Sri Lanka	10,653
Lebanon	8,912	Egypt	8,395	Hungary	10,250
Egypt	8,440	South Korea	7,008	Czechoslovakia	9,714
Austria	6,714	Ireland	6,502	El Salvador	9,630
Pakistan	5,727	Pakistan	6,396	Egypt	9,611
Denmark	5,275	Chile	6,191	Pakistan	9,431
Belgium	5,215	Austria	5,846	USSR	9,385
Barbados	4,853	Iran	5,818	Chile	8,765
Morocco	4,656	Morocco	5,484	Romania	7,446
Chile	4,587	South Africa	5,439	South Africa	7,403
Spain	4,582	Tanzania	5,287	Tanzania	6,686
Romania	4,397	Romania	4,781	Morocco	6,611
Malta	4,373	Belgium	4,745	Cambodia	6,560
Ireland	4,320	Barbados	4,725	Ireland	6,247
South Africa	4,221	Israel	4,599	Israel	5,917
Tanzania	4,172	Fiji	4,525	Kenya	5,882

A.1 : Country of birth, working age males (18-54) in CMAs, weighted frequency — (*continued*)

Base year: 1980		Base year: 1985		Base year: 1990	
Israel	4,135	Denmark	4,521	Fiji	5,853
Switzerland	3,774	Sri Lanka	4,387	Ethiopia	5,744
Finland	3,743	Spain	4,179	Taiwan	5,336
Fiji	3,621	Cambodia	4,009	Malaysia	5,236
Australia	3,210	Malta	3,837	Laos	4,974
Uganda	3,146	Kenya	3,750	Barbados	4,589
Japan	3,094	El Salvador	3,682	Austria	4,557
South Korea	3,043	Switzerland	3,559	Belgium	4,417
Kenya	2,821	Uganda	3,412	Argentina	4,085
North Korea	2,658	Laos	3,403	Syria	3,796
Turkey	2,591	Malaysia	3,239	Uganda	3,702
Malaysia	2,446	Australia	3,163	Turkey	3,653
Argentina	2,391	Japan	3,125	Denmark	3,644
New Zealand	2,097	Finland	3,099	Peru	3,503
Ecuador	2,020	Turkey	3,089	Australia	3,328
Laos	1,935	Argentina	3,000	Spain	3,322
Syria	1,927	Ecuador	2,434	Japan	3,312
Iran	1,912	Syria	2,300	Ecuador	3,214
Indonesia	1,911	Taiwan	2,231	Switzerland	3,208
Colombia	1,717	Iraq	1,989	Ghana	3,187
Sweden	1,706	Cyprus	1,955	Malta	3,159
Cyprus	1,691	Peru	1,906	Iraq	3,036
Cambodia	1,625	Indonesia	1,835	Guatemala	2,920
Sri Lanka	1,625	New Zealand	1,807	Finland	2,808
Uruguay	1,397	Colombia	1,803	Mexico	2,544
Iraq	1,343	Mexico	1,675	Colombia	2,507
Mexico	1,318	Uruguay	1,657	Somalia	2,352
Peru	1,288	Sweden	1,572	Brazil	2,162
Norway	1,274	Ethiopia	1,499	Afghanistan	2,138
Algeria	1,200	Brazil	1,434	Uruguay	2,105
Mauritius	1,159	Ghana	1,413	Bangladesh	2,087
S.W. Africa	1,038	Mauritius	1,381	Mauritius	2,072
Brazil	1,032	Guatemala	1,338	New Zealand	2,035
Singapore	955	Grenada	1,276	Indonesia	1,965
Tunisia	903	Singapore	1,219	Brunei	1,796
St. Vincent	839	Paraguay	1,190	Singapore	1,771
Ghana	814	Algeria	1,062	Nicaragua	1,758
Paraguay	786	Norway	1,005	Cyprus	1,733
Grenada	770	St. Vincent & Grenadines	985	Algeria	1,690
Nigeria	761	Tunisia	951	Sweden	1,578
Venezuela	698	Venezuela	940	Macao	1,486
Bulgaria	512	Bangladesh	921	St.Vincent & Grenadines	1,485

A.1 : Country of birth, working age males (18-54) in CMAs, weighted frequency — (*end*)

Base year: 1980		Base year: 1985		Base year: 1990	
Burma	510	Nigeria	879	Nigeria	1,462
Jordan	502	Macao	868	Grenada	1,456
Bangladesh	501	Burma	785	Tunisia	1,303
Guatemala	496	Jordan	693	Paraguay	1,278
El Salvador	493	Brunei	686	Venezuela	1,176
Bermuda	410	Afghanistan	559	Bulgaria	1,031
Netherlands Antilles	382	Bulgaria	532	Norway	989
Rhodesia	371	Antigua	522	Jordan	909
Antigua	362	St. Lucia	507	Myanmar	788
St.Kitts & Nevis	354	Cuba	488	Zaire	735

A.2 : Ethnic groups, working age males (18-54) in CMAs, 1980 weighted frequency

Italian	138,420		Romanian	1,776
Chinese	69,541		Macedonian	1,770
German	57,047		Iranian	1,769
Portuguese	45,686		Estonian	1,732
Greek	36,696		Serbian	1,719
Dutch	28,332		Fijian	1,665
Jewish	20,329		Lettish (Latvian)	1,538
Caribbean	19,878		Chilean	1,502
Filipino	15,948		Swedish	1,484
Polish	15,513		Russian	1,476
Hungarian	14,875		Norwegian	1,426
Spanish	13,710		Turk	1,424
Vietnamese	9,126		Laotian	1,369
Croatian	8,138		Slovene	1,270
Ukrainian	7,081		Lithuanian	1,220
Armenian	5,694		Cambodian	961
Lebanese	5,500		Mexican	538
Korean	5,410		Malay	494
Danish	4,691		Syrian	485
Haitian	4,336		Bulgarian	436
Austrian	3,995		Indonesian	431
Czech	3,949		Gujarati	404
Maltese	3,854		Argentinian	348
Finnish	3,728		Peruvian	301
Egyptian	2,967		Ecuadorian	292
Japanese	2,930		Singhelese	246
Swiss	2,630		Palestinian	236
Belgian	2,074		Brazilian	232
Punjabi	2,049		Bengali	230
Slovak	1,907		Albanian	219

A.3 : Language groups, working age males (18-54) in CMAs, 1980 weighted frequency							
Italian	131,448		Armenian	5,109		Latvian	1,412
Chinese	59,489		Korean	4,931		Serbian	1,382
German	58,803		Danish	4,602		Kam-Tai	1,312
Portuguese	44,271		Urdu	4,377		Swedish	1,210
Greek	34,648		Finnish	3,383		Bengali	1,123
Dutch & Flemish	24,618		Russian	3,056		Norwegian	1,080
Spanish	20,149		Japanese	2,828		Lithuanian	996
Arabic	17,937		Slovak	2,673		Flemish	922
Hungarian	15,670		Hebrew	2,371		Cambodian	820
Polish	13,963		Macedonian	2,349		Tamil	788
Punjabi	11,734		Romanian	2,329		Malay, Bahasa	691
Philippino	9,883		Tagalog	2,132		Malayalam	680
Croatian	8,413		Yiddish	1,680		Bulgarian	448
Vietnamese	8,262		Estonian	1,637		Cingalese	361
Ukrainian	6,375		Iranian	1,598		Welsh	357
Hindi	5,951		Slovenian	1,580		Swahili	235
Czech	5,413		Turkish	1,523			

A.4 : Visible minorities, working age males (18-54) in CMAs, 1980 weighted frequency				
Not a Minority	680,859		Filipinos	16,126
Chinese	70,140		Latin Americans	14,363
Black	60,974		Southeast Asian	13,793
Indo-Pakistanis	56,491		Korean	5,491
Pacific Islanders	28,051		Japanese	2,989

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